

Art Unit: 2800

Clmpto

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Claims- 1-40 has been cancel

41. (Amended) A method for forming a semiconductor layer, the method comprising:

forming a first heterostructure by:

forming a graded  $\text{Si}_{1-x}\text{Ge}_x$  buffer layer on a first substrate, the graded  $\text{Si}_{1-x}\text{Ge}_x$  buffer layer having a Ge concentration  $x$  increasing from zero to a value  $y$ ;

forming a relaxed  $\text{Si}_{1-y}\text{Ge}_y$  layer on the graded  $\text{Si}_{1-x}\text{Ge}_x$  buffer layer;

forming a separation layer on the relaxed  $\text{Si}_{1-y}\text{Ge}_y$  layer; and

forming a second relaxed layer over the separation layer;

bonding the first heterostructure to a second substrate to define a second heterostructure; and

splitting the second heterostructure along the separation layer,

wherein the second relaxed layer remains on the second substrate after the second heterostructure is split.

42. (Amended) The method of claim 56, wherein the strained layer comprises at least one of  $\text{Si}_{1-z}\text{Ge}_z$  with  $z \neq y$  and a III-V material.

43. (Amended) The method of claim 41, wherein at least one of the relaxed layer and the separation layer comprises at least one material selected from the group consisting of  $\text{Si}_{1-w}\text{Ge}_w$ , Ge, GaAs, AlAs, ZnSe and InGaP.
44. (Amended) The method of claim 41, further comprising:  
forming at least one of a device layer and a device, after the step of forming the second relaxed layer.
45. (Amended) The method of claim 57, further comprising:  
forming an insulating layer before the step of introducing ions.
46. (Amended) The method of claim 57, further comprising:  
planarizing the second relaxed layer before the step of introducing ions.
47. (Amended) The method of claim 57, wherein the ions comprise at least one of hydrogen  $\text{H}^+$  ions and  $\text{H}_2^+$  ions.
48. (Amended) The method of claim 41, further comprising:  
planarizing the second relaxed layer before bonding the first heterostructure to the second substrate.
49. (Amended) The method of claim 41, further comprising:

cleaning at least one of the first heterostructure and the second substrate before the step of bonding.

50. (Amended) The method of claim 41, wherein splitting the second heterostructure comprises annealing.

51. (Amended) The method of claim 41, further comprising:  
removing at least one of (i) a remaining portion of the separation layer, and (ii) a top portion of the second relaxed layer from the second substrate after the step of splitting.

52. (Amended) The method of claim 41, further comprising:  
forming at least one of a device layer and a device after the step of splitting.

53. (Amended) The method of claim 41, further comprising:  
after splitting the second heterostructure along the separation layer, planarizing a portion of the first heterostructure split from the second substrate; and  
forming new layers on the remaining first heterostructure portion.

claims- 54-55 has been cancel

add newly claims-56-61

56. (New) The method of claim 41 wherein the separation layer comprises a strained layer.

57. (New) The method of claim 41, further comprising:  
introducing ions into the separation layer, prior to bonding the first heterostructure to the second substrate.

58. (New) The method of claim 41 wherein the separation layer comprises a defect layer.

59. (New) The method of claim 41 wherein the second substrate comprises silicon.

60. (New) The method of claim 41 wherein the second substrate comprises an insulator layer.

61. (New) The method of claim 41 wherein bonding the first heterostructure to the second substrate comprises bonding to the insulator layer.